

SEQUENCE LISTING

<110> Franz Ertl, Peter
Wayne Gough, Gerald
Jeffrey Alan Ring, Christopher
Parmar, Vanita
Marina Walcott, Sarah

<120> Papilloma Virus Sequences

<130> PG4082-1C1

<140> Unassigned

<141> Herewith

<150> 09/939,471

<151> 2001-08-24

<150> PCT/GB01/03290

<151> 2000-07-21

<150> GB0017990.3

<151> 2000-11-02

<160> 21

<170> FastSEQ for Windows Version 4.0

<210> 1

<211> 649

<212> PRT

<213> Human papillomavirus type 6a

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Met	Ala	Asp	Asp	Ser	Gly	Thr	Glu	Asn	Glu	Gly	Ser	Gly	Cys	Thr	Gly
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Trp	Phe	Met	Val	Glu	Ala	Ile	Val	Gln	His	Pro	Thr	Gly	Thr	Gln	Ile
			20					25					30		

Ser	Asp	Asp	Glu	Asp	Glu	Glu	Val	Glu	Asp	Ser	Gly	Tyr	Asp	Met	Val
	35						40					45			
Asp	Phe	Ile	Asp	Asp	Ser	Asn	Ile	Thr	His	Asn	Ser	Leu	Glu	Ala	Gln
	50					55					60				
Ala	Leu	Phe	Asn	Arg	Gln	Glu	Ala	Asp	Thr	His	Tyr	Ala	Thr	Val	Gln
65					70					75					80
Asp	Leu	Lys	Arg	Lys	Tyr	Leu	Gly	Ser	Pro	Tyr	Val	Ser	Pro	Ile	Asn
				85					90					95	
Thr	Ile	Ala	Glu	Ala	Val	Glu	Ser	Glu	Ile	Ser	Pro	Arg	Leu	Asp	Ala
			100					105					110		
Ile	Lys	Leu	Thr	Arg	Gln	Pro	Lys	Lys	Val	Lys	Arg	Arg	Leu	Phe	Gln
	115						120					125			
Thr	Arg	Glu	Leu	Thr	Asp	Ser	Gly	Tyr	Gly	Tyr	Ser	Glu	Val	Glu	Ala
	130					135					140				
Gly	Thr	Gly	Thr	Gln	Val	Glu	Lys	His	Gly	Val	Pro	Glu	Asn	Gly	Gly
145				150						155					160
Asp	Gly	Gln	Glu	Lys	Asp	Thr	Gly	Arg	Asp	Ile	Glu	Gly	Glu	Glu	His
				165					170					175	
Thr	Glu	Ala	Glu	Ala	Pro	Thr	Asn	Ser	Val	Arg	Glu	His	Ala	Gly	Thr
			180					185					190		
Ala	Gly	Ile	Leu	Glu	Leu	Leu	Lys	Cys	Lys	Asp	Leu	Arg	Ala	Ala	Leu
	195						200					205			
Leu	Gly	Lys	Phe	Lys	Glu	Cys	Phe	Gly	Leu	Ser	Phe	Ile	Asp	Leu	Ile
	210					215					220				
Arg	Pro	Phe	Lys	Ser	Asp	Lys	Thr	Thr	Cys	Leu	Asp	Trp	Val	Val	Ala
225					230					235					240
Gly	Phe	Gly	Ile	His	His	Ser	Ile	Ser	Glu	Ala	Phe	Gln	Lys	Leu	Ile
				245					250					255	
Glu	Pro	Leu	Ser	Leu	Tyr	Ala	His	Ile	Gln	Trp	Leu	Thr	Asn	Ala	Trp
		260						265					270		
Gly	Met	Val	Leu	Leu	Val	Leu	Leu	Arg	Phe	Lys	Val	Asn	Lys	Ser	Arg
	275						280					285			
Ser	Thr	Val	Ala	Arg	Thr	Leu	Ala	Thr	Leu	Leu	Asn	Ile	Pro	Glu	Asn
	290					295					300				
Gln	Met	Leu	Ile	Glu	Pro	Pro	Lys	Ile	Gln	Ser	Gly	Val	Ala	Ala	Leu
305					310					315					320
Tyr	Trp	Phe	Arg	Thr	Gly	Ile	Ser	Asn	Ala	Ser	Thr	Val	Ile	Gly	Glu
				325					330					335	
Ala	Pro	Glu	Trp	Ile	Thr	Arg	Gln	Thr	Val	Ile	Glu	His	Gly	Leu	Ala
			340					345						350	

Asp Ser Gln Phe Lys Leu Thr Glu Met Val Gln Trp Ala Tyr Asp Asn
 355 360 365
 Asp Ile Cys Glu Glu Ser Glu Ile Ala Phe Glu Tyr Ala Gln Arg Gly
 370 375 380
 Asp Phe Asp Ser Asn Ala Arg Ala Phe Leu Asn Ser Asn Met Gln Ala
 385 390 395 400
 Lys Tyr Val Lys Asp Cys Ala Thr Met Cys Arg His Tyr Lys His Ala
 405 410 415
 Glu Met Arg Lys Met Ser Ile Lys Gln Trp Ile Lys His Arg Gly Ser
 420 425 430
 Lys Ile Glu Gly Thr Gly Asn Trp Lys Pro Ile Val Gln Phe Leu Arg
 435 440 445
 His Gln Asn Ile Glu Phe Ile Pro Phe Leu Thr Lys Phe Lys Leu Trp
 450 455 460
 Leu His Gly Thr Pro Lys Lys Asn Cys Ile Ala Ile Val Gly Pro Pro
 465 470 475 480
 Asp Thr Gly Lys Ser Tyr Phe Cys Met Ser Leu Ile Ser Phe Leu Gly
 485 490 495
 Gly Thr Val Ile Ser His Val Asn Ser Ser Ser His Phe Trp Leu Gln
 500 505 510
 Pro Leu Val Asp Ala Lys Val Ala Leu Leu Asp Asp Ala Thr Gln Pro
 515 520 525
 Cys Trp Ile Tyr Met Asp Thr Tyr Met Arg Asn Leu Leu Asp Gly Asn
 530 535 540
 Pro Met Ser Ile Asp Arg Lys His Lys Ala Leu Thr Leu Ile Lys Cys
 545 550 555 560
 Pro Pro Leu Leu Val Thr Ser Asn Ile Asp Ile Thr Lys Glu Asp Lys
 565 570 575
 Tyr Lys Tyr Leu His Thr Arg Val Thr Thr Phe Thr Phe Pro Asn Pro
 580 585 590
 Phe Pro Phe Asp Arg Asn Gly Asn Ala Val Tyr Glu Leu Ser Asn Thr
 595 600 605
 Asn Trp Lys Cys Phe Phe Glu Arg Leu Ser Ser Ser Leu Asp Ile Gln
 610 615 620
 Asp Ser Glu Asp Glu Glu Asp Gly Ser Asn Ser Gln Ala Phe Arg Cys
 625 630 635 640
 Val Pro Gly Thr Val Val Arg Thr Leu
 645

<213> Human papillomavirus type 6a

Met	Ala	Asp	Asp	Ser	Gly	Thr	Glu	Asn	Glu	Gly	Ser	Gly	Cys	Thr	Gly
1				5					10					15	
Trp	Phe	Met	Val	Glu	Ala	Ile	Val	Gln	His	Pro	Thr	Gly	Thr	Gln	Ile
			20					25					30		
Ser	Asp	Asp	Glu	Asp	Glu	Glu	Val	Glu	Asp	Ser	Gly	Tyr	Asp	Met	Val
		35					40					45			
Asp	Phe	Ile	Asp	Asp	Ser	Asn	Ile	Thr	His	Asn	Ser	Leu	Glu	Ala	Gln
	50					55					60				
Ala	Leu	Phe	Asn	Arg	Gln	Glu	Ala	Asp	Thr	His	Tyr	Ala	Thr	Val	Gln
65					70					75					80
Asp	Leu	Lys	Arg	Lys	Tyr	Leu	Gly	Ser	Pro	Tyr	Val	Ser	Pro	Ile	Asn
				85					90					95	
Thr	Ile	Ala	Glu	Ala	Val	Glu	Ser	Glu	Ile	Ser	Pro	Arg	Leu	Asp	Ala
			100					105					110		
Ile	Lys	Leu	Thr	Arg	Gln	Pro	Lys	Lys	Val	Lys	Arg	Arg	Leu	Phe	Gln
		115					120					125			
Thr	Arg	Glu	Leu	Thr	Asp	Ser	Gly	Tyr	Gly	Tyr	Ser	Glu	Val	Glu	Ala
	130					135					140				
Gly	Thr	Gly	Thr	Gln	Val	Glu	Lys	His	Gly	Val	Pro	Glu	Asn	Gly	Gly
145					150					155					160
Asp	Gly	Gln	Glu	Lys	Asp	Thr	Gly	Arg	Asp	Ile	Glu	Gly	Glu	Glu	His
				165					170					175	
Thr	Glu	Ala	Glu	Ala	Pro	Thr	Asn	Ser	Val	Arg	Glu	His	Ala	Gly	Thr
			180					185					190		
Ala	Gly	Ile	Leu	Glu	Leu	Leu	Lys	Cys	Lys	Asp	Leu	Arg	Ala	Ala	Leu
		195					200					205			
Leu	Gly	Lys	Phe	Lys	Glu	Cys	Phe	Gly	Leu	Ser	Phe	Ile	Asp	Leu	Ile
	210					215					220				
Arg	Pro	Phe	Lys	Ser	Asp	Lys	Thr	Thr	Cys	Ala	Asp	Trp	Val	Val	Ala
225					230					235					240
Gly	Phe	Gly	Ile	His	His	Ser	Ile	Ser	Glu	Ala	Phe	Gln	Lys	Leu	Ile
				245					250					255	
Glu	Pro	Leu	Ser	Leu	Tyr	Ala	His	Ile	Gln	Trp	Leu	Thr	Asn	Ala	Trp
			260					265					270		

Gly Met Val Leu Leu Val Leu Val Arg Phe Lys Val Asn Lys Ser Arg
 275 280 285
 Ser Thr Val Ala Arg Thr Leu Ala Thr Leu Leu Asn Ile Pro Asp Asn
 290 295 300
 Gln Met Leu Ile Glu Pro Pro Lys Ile Gln Ser Gly Val Ala Ala Leu
 305 310 315 320
 Tyr Trp Phe Arg Thr Gly Ile Ser Asn Ala Ser Thr Val Ile Gly Glu
 325 330 335
 Ala Pro Glu Trp Ile Thr Arg Gln Thr Val Ile Glu His Gly Leu Ala
 340 345 350
 Asp Ser Gln Phe Lys Leu Thr Glu Met Val Gln Trp Ala Tyr Asp Asn
 355 360 365
 Asp Ile Cys Glu Glu Ser Glu Ile Ala Phe Glu Tyr Ala Gln Arg Gly
 370 375 380
 Asp Phe Asp Ser Asn Ala Arg Ala Phe Leu Asn Ser Asn Met Gln Ala
 385 390 395 400
 Lys Tyr Val Lys Asp Cys Ala Thr Met Cys Arg His Tyr Lys His Ala
 405 410 415
 Glu Met Arg Lys Met Ser Ile Lys Gln Trp Ile Lys His Arg Gly Ser
 420 425 430
 Lys Ile Glu Gly Thr Gly Asn Trp Lys Pro Ile Val Gln Phe Leu Arg
 435 440 445
 His Gln Asn Ile Glu Phe Ile Pro Phe Leu Ser Lys Phe Lys Leu Trp
 450 455 460
 Leu His Gly Thr Pro Lys Lys Asn Cys Ile Ala Ile Val Gly Pro Pro
 465 470 475 480
 Asp Thr Gly Lys Ser Tyr Phe Cys Met Ser Leu Ile Ser Phe Leu Gly
 485 490 495
 Gly Thr Val Ile Ser His Val Asn Ser Ser Ser His Phe Trp Leu Gln
 500 505 510
 Pro Leu Val Asp Ala Lys Val Ala Leu Leu Asp Asp Ala Thr Gln Pro
 515 520 525
 Cys Trp Ile Tyr Met Asp Thr Tyr Met Arg Asn Leu Leu Asp Gly Asn
 530 535 540
 Pro Met Ser Ile Asp Arg Lys His Lys Ala Leu Thr Leu Ile Lys Cys
 545 550 555 560
 Pro Pro Leu Leu Val Thr Ser Asn Ile Asp Ile Thr Lys Glu Glu Lys
 565 570 575
 Tyr Lys Tyr Leu His Thr Arg Val Thr Thr Phe Thr Phe Pro Asn Pro
 580 585 590

Phe Pro Phe Asp Arg Asn Gly Asn Ala Val Tyr Glu Leu Ser Asn Ala
 595 600 605
 Asn Trp Lys Cys Phe Phe Glu Arg Leu Ser Ser Ser Leu Asp Ile Gln
 610 615 620
 Asp Ser Glu Asp Glu Glu Asp Gly Ser Asn Ser Gln Ala Phe Arg Cys
 625 630 635 640
 Val Pro Gly Thr Val Val Arg Thr Leu
 645

<210> 3

<211> 649

<212> PRT

<213> Human papillomavirus type 11

<400> 3

Met Ala Asp Asp Ser Gly Thr Glu Asn Glu Gly Ser Gly Cys Thr Gly
 1 5 10 15
 Trp Phe Met Val Glu Ala Ile Val Glu His Thr Thr Gly Thr Gln Ile
 20 25 30
 Ser Glu Asp Glu Glu Glu Glu Val Glu Asp Ser Gly Tyr Asp Met Val
 35 40 45
 Asp Phe Ile Asp Asp Arg His Ile Thr Gln Asn Ser Val Glu Ala Gln
 50 55 60
 Ala Leu Phe Asn Arg Gln Glu Ala Asp Ala His Tyr Ala Thr Val Gln
 65 70 75 80
 Asp Leu Lys Arg Lys Tyr Leu Gly Ser Pro Tyr Val Ser Pro Ile Ser
 85 90 95
 Asn Val Ala Asn Ala Val Glu Ser Glu Ile Ser Pro Arg Leu Asp Ala
 100 105 110
 Ile Lys Leu Thr Thr Gln Pro Lys Lys Val Lys Arg Arg Leu Phe Glu
 115 120 125
 Thr Arg Glu Leu Thr Asp Ser Gly Tyr Gly Tyr Ser Glu Val Glu Ala
 130 135 140
 Ala Thr Gln Val Glu Lys His Gly Asp Pro Glu Asn Gly Gly Asp Gly
 145 150 155 160
 Gln Glu Arg Asp Thr Gly Arg Asp Ile Glu Gly Glu Gly Val Glu His
 165 170 175
 Arg Glu Ala Glu Ala Val Asp Asp Ser Thr Arg Glu His Ala Asp Thr
 180 185 190

Ser Gly Ile Leu Glu Leu Leu Lys Cys Lys Asp Ile Arg Ser Thr Leu			
195	200	205	
His Gly Lys Phe Lys Asp Cys Phe Gly Leu Ser Phe Val Asp Leu Ile			
210	215	220	
Arg Pro Phe Lys Ser Asp Arg Thr Thr Cys Ala Asp Trp Val Val Ala			
225	230	235	240
Gly Phe Gly Ile His His Ser Ile Ala Asp Ala Phe Gln Lys Leu Ile			
	245	250	255
Glu Pro Leu Ser Leu Tyr Ala His Ile Gln Trp Leu Thr Asn Ala Trp			
	260	265	270
Gly Met Val Leu Leu Val Leu Ile Arg Phe Lys Val Asn Lys Ser Arg			
	275	280	285
Cys Thr Val Ala Arg Thr Leu Gly Thr Leu Leu Asn Ile Pro Glu Asn			
	290	295	300
His Met Leu Ile Glu Pro Pro Lys Ile Gln Ser Gly Val Arg Ala Leu			
305	310	315	320
Tyr Trp Phe Arg Thr Gly Ile Ser Asn Ala Ser Thr Val Ile Gly Glu			
	325	330	335
Ala Pro Glu Trp Ile Thr Arg Gln Thr Val Ile Glu His Ser Leu Ala			
	340	345	350
Asp Ser Gln Phe Lys Leu Thr Glu Met Val Gln Trp Ala Tyr Asp Asn			
	355	360	365
Asp Ile Cys Glu Glu Ser Glu Ile Ala Phe Glu Tyr Ala Gln Arg Gly			
	370	375	380
Asp Phe Asp Ser Asn Ala Arg Ala Phe Leu Asn Ser Asn Met Gln Ala			
385	390	395	400
Lys Tyr Val Lys Asp Cys Ala Ile Met Cys Arg His Tyr Lys His Ala			
	405	410	415
Glu Met Lys Lys Met Ser Ile Lys Gln Trp Ile Lys Tyr Arg Gly Thr			
	420	425	430
Lys Val Asp Ser Val Gly Asn Trp Lys Pro Ile Val Gln Phe Leu Arg			
	435	440	445
His Gln Asn Ile Glu Phe Ile Pro Phe Leu Ser Lys Leu Lys Leu Trp			
	450	455	460
Leu His Gly Thr Pro Lys Lys Asn Cys Ile Ala Ile Val Gly Pro Pro			
465	470	475	480
Asp Thr Gly Lys Ser Cys Phe Cys Met Ser Leu Ile Lys Phe Leu Gly			
	485	490	495
Gly Thr Val Ile Ser Tyr Val Asn Ser Cys Ser His Phe Trp Leu Gln			
	500	505	510

Pro Leu Thr Asp Ala Lys Val Ala Leu Leu Asp Asp Ala Thr Gln Pro
 515 520 525
 Cys Trp Thr Tyr Met Asp Thr Tyr Met Arg Asn Leu Leu Asp Gly Asn
 530 535 540
 Pro Met Ser Ile Asp Arg Lys His Arg Ala Leu Thr Leu Ile Lys Cys
 545 550 555 560
 Pro Pro Leu Leu Val Thr Ser Asn Ile Asp Ile Ser Lys Glu Glu Lys
 565 570 575
 Tyr Lys Tyr Leu His Ser Arg Val Thr Thr Phe Thr Phe Pro Asn Pro
 580 585 590
 Phe Pro Phe Asp Arg Asn Gly Asn Ala Val Tyr Glu Leu Ser Asp Ala
 595 600 605
 Asn Trp Lys Cys Phe Phe Glu Arg Leu Ser Ser Ser Leu Asp Ile Glu
 610 615 620
 Asp Ser Glu Asp Glu Glu Asp Gly Ser Asn Ser Gln Ala Phe Arg Cys
 625 630 635 640
 Val Pro Gly Ser Val Val Arg Thr Leu
 645

<210> 4

<211> 649

<212> PRT

<213> Artificial Sequence

<220>

<223> HPV6b E1 amino acid sequence including point
 mutations to remove biological activity

<400> 4

Met Ala Asp Asp Ser Gly Thr Glu Asn Glu Gly Ser Gly Cys Thr Gly
 1 5 10 15
 Trp Phe Met Val Glu Ala Ile Val Gln His Pro Thr Gly Thr Gln Ile
 20 25 30
 Ser Asp Asp Glu Asp Glu Glu Val Glu Asp Ser Gly Tyr Asp Met Val
 35 40 45
 Asp Phe Ile Asp Asp Ser Asn Ile Thr His Asn Ser Leu Glu Ala Gln
 50 55 60
 Ala Leu Phe Asn Arg Gln Glu Ala Asp Thr His Tyr Ala Thr Val Gln
 65 70 75 80

Asp Leu Gly Gly Lys Tyr Leu Gly Ser Pro Tyr Val Ser Pro Ile Asn
 85 90 95
 Thr Ile Ala Glu Ala Val Glu Ser Glu Ile Ser Pro Arg Leu Asp Ala
 100 105 110
 Ile Lys Leu Thr Arg Gln Pro Lys Lys Val Lys Arg Arg Leu Phe Gln
 115 120 125
 Thr Arg Glu Leu Thr Asp Ser Gly Tyr Gly Tyr Ser Glu Val Glu Ala
 130 135 140
 Gly Thr Gly Thr Gln Val Glu Lys His Gly Val Pro Glu Asn Gly Gly
 145 150 155 160
 Asp Gly Gln Glu Lys Asp Thr Gly Arg Asp Ile Glu Gly Glu Glu His
 165 170 175
 Thr Glu Ala Glu Ala Pro Thr Asn Ser Val Arg Glu His Ala Gly Thr
 180 185 190
 Ala Gly Ile Leu Glu Leu Leu Lys Cys Lys Asp Leu Arg Ala Ala Leu
 195 200 205
 Leu Gly Lys Phe Lys Glu Cys Phe Gly Leu Ser Phe Ile Asp Leu Ile
 210 215 220
 Arg Pro Phe Lys Ser Asp Lys Thr Thr Cys Leu Asp Trp Val Val Ala
 225 230 235 240
 Gly Phe Gly Ile His His Ser Ile Ser Glu Ala Phe Gln Lys Leu Ile
 245 250 255
 Glu Pro Leu Ser Leu Tyr Ala His Ile Gln Trp Leu Thr Asn Ala Trp
 260 265 270
 Gly Met Val Leu Leu Val Leu Leu Arg Phe Lys Val Asn Lys Ser Arg
 275 280 285
 Ser Thr Val Ala Arg Thr Leu Ala Thr Leu Leu Asn Ile Pro Glu Asn
 290 295 300
 Gln Met Leu Ile Glu Pro Pro Lys Ile Gln Ser Gly Val Ala Ala Leu
 305 310 315 320
 Tyr Trp Phe Arg Thr Gly Ile Ser Asn Ala Ser Thr Val Ile Gly Glu
 325 330 335
 Ala Pro Glu Trp Ile Thr Arg Gln Thr Val Ile Glu His Gly Leu Ala
 340 345 350
 Asp Ser Gln Phe Lys Leu Thr Glu Met Val Gln Trp Ala Tyr Asp Asn
 355 360 365
 Asp Ile Cys Glu Glu Ser Glu Ile Ala Phe Glu Tyr Ala Gln Arg Gly
 370 375 380
 Asp Phe Asp Ser Asn Ala Arg Ala Phe Leu Asn Ser Asn Met Gln Ala
 385 390 395 400

Lys Tyr Val Lys Asp Cys Ala Thr Met Cys Arg His Tyr Lys His Ala
 405 410 415
 Glu Met Arg Lys Met Ser Ile Lys Gln Trp Ile Lys His Arg Gly Ser
 420 425 430
 Lys Ile Glu Gly Thr Gly Asn Trp Lys Pro Ile Val Gln Phe Leu Arg
 435 440 445
 His Gln Asn Ile Glu Phe Ile Pro Phe Leu Thr Lys Phe Lys Leu Trp
 450 455 460
 Leu His Gly Thr Pro Lys Lys Asn Cys Ile Ala Ile Val Gly Pro Pro
 465 470 475 480
 Asp Thr Asp Lys Ser Tyr Phe Cys Met Ser Leu Ile Ser Phe Leu Gly
 485 490 495
 Gly Thr Val Ile Ser His Val Asn Ser Ser Ser His Phe Trp Leu Gln
 500 505 510
 Pro Leu Val Asp Ala Lys Val Ala Leu Leu Asp Asp Ala Thr Gln Pro
 515 520 525
 Cys Trp Ile Tyr Met Asp Thr Tyr Met Arg Asn Leu Leu Asp Gly Asn
 530 535 540
 Pro Met Ser Ile Asp Arg Lys His Lys Ala Leu Thr Leu Ile Lys Cys
 545 550 555 560
 Pro Pro Leu Leu Val Thr Ser Asn Ile Asp Ile Thr Lys Glu Asp Lys
 565 570 575
 Tyr Lys Tyr Leu His Thr Arg Val Thr Thr Phe Thr Phe Pro Asn Pro
 580 585 590
 Phe Pro Phe Asp Arg Asn Gly Asn Ala Val Tyr Glu Leu Ser Asn Thr
 595 600 605
 Asn Trp Lys Cys Phe Phe Glu Arg Leu Ser Ser Ser Leu Asp Ile Gln
 610 615 620
 Asp Ser Glu Asp Glu Glu Asp Gly Ser Asn Ser Gln Ala Phe Arg Cys
 625 630 635 640
 Val Pro Gly Thr Val Val Arg Thr Leu
 645

<210> 5

<211> 367

<212> PRT

<213> Human papillomavirus type 11

<400> 5

Met Glu Ala Ile Ala Lys Arg Leu Asp Ala Cys Gln Asp Gln Leu Leu
 1 5 10 15
 Glu Leu Tyr Glu Glu Asn Ser Ile Asp Ile His Lys His Ile Met His
 20 25 30
 Trp Lys Cys Ile Arg Leu Glu Ser Val Leu Leu His Lys Ala Lys Gln
 35 40 45
 Met Gly Leu Ser His Ile Gly Leu Gln Val Val Pro Pro Leu Thr Val
 50 55 60
 Ser Glu Thr Lys Gly His Asn Ala Ile Glu Met Gln Met His Leu Glu
 65 70 75 80
 Ser Leu Ala Lys Thr Gln Tyr Gly Val Glu Pro Trp Thr Leu Gln Asp
 85 90 95
 Thr Ser Tyr Glu Met Trp Leu Thr Pro Pro Lys Arg Cys Phe Lys Lys
 100 105 110
 Gln Gly Asn Thr Val Glu Val Lys Phe Asp Gly Cys Glu Asp Asn Val
 115 120 125
 Met Glu Tyr Val Val Trp Thr His Ile Tyr Leu Gln Asp Asn Asp Ser
 130 135 140
 Trp Val Lys Val Thr Ser Ser Val Asp Ala Lys Gly Ile Tyr Tyr Thr
 145 150 155 160
 Cys Gly Gln Phe Lys Thr Tyr Tyr Val Asn Phe Asn Lys Glu Ala Gln
 165 170 175
 Lys Tyr Gly Ser Thr Asn His Trp Glu Val Cys Tyr Gly Ser Thr Val
 180 185 190
 Ile Cys Ser Pro Ala Ser Val Ser Ser Thr Val Arg Glu Val Ser Ile
 195 200 205
 Ala Glu Pro Thr Thr Tyr Thr Pro Ala Gln Thr Thr Ala Pro Thr Val
 210 215 220
 Ser Ala Cys Thr Thr Glu Asp Gly Val Ser Ala Pro Pro Arg Lys Arg
 225 230 235 240
 Ala Arg Gly Pro Ser Thr Asn Asn Thr Leu Cys Val Ala Asn Ile Arg
 245 250 255
 Ser Val Asp Ser Thr Ile Asn Asn Ile Val Thr Asp Asn Tyr Asn Lys
 260 265 270
 His Gln Arg Arg Asn Asn Cys His Ser Ala Ala Thr Pro Ile Val Gln
 275 280 285
 Leu Gln Gly Asp Ser Asn Cys Leu Lys Cys Phe Arg Tyr Arg Leu Asn
 290 295 300
 Asp Lys Tyr Lys His Leu Phe Glu Leu Ala Ser Ser Thr Trp His Trp
 305 310 315 320

Ala	Ser	Pro	Glu	Ala	Pro	His	Lys	Asn	Ala	Ile	Val	Thr	Leu	Thr	Tyr
				325					330					335	
Ser	Ser	Glu	Glu	Gln	Arg	Gln	Gln	Phe	Leu	Asn	Ser	Val	Lys	Ile	Pro
			340					345					350		
Pro	Thr	Ile	Arg	His	Lys	Val	Gly	Phe	Met	Ser	Leu	His	Leu	Leu	
		355					360					365			

<210> 6

<211> 368

<212> PRT

<213> Human papillomavirus type 6a

<400> 6

Met	Glu	Ala	Ile	Ala	Lys	Arg	Leu	Asp	Ala	Cys	Gln	Glu	Gln	Leu	Leu
1				5				10						15	
Glu	Leu	Tyr	Glu	Glu	Asn	Ser	Thr	Asp	Leu	Asn	Lys	His	Val	Leu	His
			20					25					30		
Trp	Lys	Cys	Met	Arg	His	Glu	Ser	Val	Leu	Leu	Tyr	Lys	Ala	Lys	Gln
		35					40					45			
Met	Gly	Leu	Ser	His	Ile	Gly	Met	Gln	Val	Val	Pro	Pro	Leu	Lys	Val
	50					55					60				
Ser	Glu	Ala	Lys	Gly	His	Asn	Ala	Ile	Glu	Met	Gln	Met	His	Leu	Glu
65					70				75					80	
Ser	Leu	Leu	Lys	Thr	Glu	Tyr	Ser	Met	Glu	Pro	Trp	Thr	Leu	Gln	Glu
				85					90					95	
Thr	Ser	Tyr	Glu	Met	Trp	Gln	Thr	Pro	Pro	Lys	Arg	Cys	Phe	Lys	Lys
			100					105					110		
Arg	Gly	Lys	Thr	Val	Glu	Val	Lys	Phe	Asp	Gly	Cys	Ala	Asn	Asn	Thr
		115					120					125			
Met	Asp	Tyr	Val	Val	Trp	Thr	Asp	Val	Tyr	Val	Gln	Asp	Thr	Asp	Ser
	130					135					140				
Trp	Val	Lys	Val	His	Ser	Met	Val	Asp	Ala	Lys	Gly	Ile	Tyr	Tyr	Thr
145					150				155					160	
Cys	Gly	Gln	Phe	Lys	Thr	Tyr	Tyr	Val	Asn	Phe	Val	Lys	Glu	Ala	Glu
			165					170					175		
Lys	Tyr	Gly	Ser	Thr	Lys	Gln	Trp	Glu	Val	Cys	Tyr	Gly	Ser	Thr	Val
		180						185					190		
Ile	Cys	Ser	Pro	Ala	Ser	Val	Ser	Ser	Thr	Thr	Gln	Glu	Val	Ser	Ile
		195					200					205			

Pro Glu Ser Thr Thr Tyr Thr Pro Ala Gln Thr Ser Thr Pro Val Ser
 210 215 220
 Ser Ser Thr Gln Glu Asp Ala Val Gln Thr Pro Pro Arg Lys Arg Ala
 225 230 235 240
 Arg Gly Val Gln Gln Ser Pro Cys Asn Ala Leu Cys Val Ala His Ile
 245 250 255
 Gly Pro Val Asp Ser Gly Asn His Asn Leu Ile Thr Asn Asn His Asp
 260 265 270
 Gln His Gln Arg Arg Asn Asn Ser Asn Ser Ser Ala Thr Pro Ile Val
 275 280 285
 Gln Phe Gln Gly Glu Ser Asn Cys Leu Lys Cys Phe Arg Tyr Arg Leu
 290 295 300
 Asn Asp Lys His Arg His Leu Phe Asp Leu Ile Ser Ser Thr Trp His
 305 310 315 320
 Trp Ala Ser Pro Lys Ala Pro His Lys His Ala Ile Val Thr Val Thr
 325 330 335
 Tyr His Ser Glu Glu Gln Arg Gln Gln Phe Leu Asn Val Val Lys Ile
 340 345 350
 Pro Pro Thr Ile Arg His Lys Leu Gly Phe Met Ser Leu His Leu Leu
 355 360 365

<210> 7
 <211> 368
 <212> PRT
 <213> Human papillomavirus type 6b

<400> 7
 Met Glu Ala Ile Ala Lys Arg Leu Asp Ala Cys Gln Glu Gln Leu Leu
 1 5 10 15
 Glu Leu Tyr Glu Glu Asn Ser Thr Asp Leu His Lys His Val Leu His
 20 25 30
 Trp Lys Cys Met Arg His Glu Ser Val Leu Leu Tyr Lys Ala Lys Gln
 35 40 45
 Met Gly Leu Ser His Ile Gly Met Gln Val Val Pro Pro Leu Lys Val
 50 55 60
 Ser Glu Ala Lys Gly His Asn Ala Ile Glu Met Gln Met His Leu Glu
 65 70 75 80
 Ser Leu Leu Arg Thr Glu Tyr Ser Met Glu Pro Trp Thr Leu Gln Glu
 85 90 95

<220>

<223> HPV11 E2 amino acid sequence including a point
mutation to remove biological activity

<400> 8

Met	Glu	Ala	Ile	Ala	Lys	Arg	Leu	Asp	Ala	Cys	Gln	Asp	Gln	Leu	Leu
1				5					10					15	
Glu	Leu	Tyr	Glu	Glu	Asn	Ser	Ile	Asp	Ile	His	Lys	His	Ile	Met	His
			20					25					30		
Trp	Lys	Cys	Ile	Arg	Leu	Glu	Ser	Val	Leu	Leu	His	Lys	Ala	Lys	Gln
		35					40					45			
Met	Gly	Leu	Ser	His	Ile	Gly	Leu	Gln	Val	Val	Pro	Pro	Leu	Thr	Val
	50					55					60				
Ser	Glu	Thr	Lys	Gly	His	Asn	Ala	Ile	Glu	Met	Gln	Met	His	Leu	Glu
65					70					75				80	
Ser	Leu	Ala	Lys	Thr	Gln	Tyr	Gly	Val	Glu	Pro	Trp	Thr	Leu	Gln	Asp
			85						90				95		
Thr	Ser	Tyr	Glu	Met	Trp	Leu	Thr	Pro	Pro	Lys	Arg	Cys	Phe	Ala	Lys
			100					105					110		
Gln	Gly	Asn	Thr	Val	Glu	Val	Lys	Phe	Asp	Gly	Cys	Glu	Asp	Asn	Val
		115					120					125			
Met	Glu	Tyr	Val	Val	Trp	Thr	His	Ile	Tyr	Leu	Gln	Asp	Asn	Asp	Ser
	130						135				140				
Trp	Val	Lys	Val	Thr	Ser	Ser	Val	Asp	Ala	Lys	Gly	Ile	Tyr	Tyr	Thr
145					150					155				160	
Cys	Gly	Gln	Phe	Lys	Thr	Tyr	Tyr	Val	Asn	Phe	Asn	Lys	Glu	Ala	Gln
			165						170				175		
Lys	Tyr	Gly	Ser	Thr	Asn	His	Trp	Glu	Val	Cys	Tyr	Gly	Ser	Thr	Val
		180						185				190			
Ile	Cys	Ser	Pro	Ala	Ser	Val	Ser	Ser	Thr	Val	Arg	Glu	Val	Ser	Ile
	195						200					205			
Ala	Glu	Pro	Thr	Thr	Tyr	Thr	Pro	Ala	Gln	Thr	Thr	Ala	Pro	Thr	Val
	210					215					220				
Ser	Ala	Cys	Thr	Thr	Glu	Asp	Gly	Val	Ser	Ala	Pro	Pro	Arg	Lys	Arg
225					230					235				240	
Ala	Arg	Gly	Pro	Ser	Thr	Asn	Asn	Thr	Leu	Cys	Val	Ala	Asn	Ile	Arg
			245					250				255			
Ser	Val	Asp	Ser	Thr	Ile	Asn	Asn	Ile	Val	Thr	Asp	Asn	Tyr	Asn	Lys
		260						265				270			

His	Gln	Arg	Arg	Asn	Asn	Cys	His	Ser	Ala	Ala	Thr	Pro	Ile	Val	Gln
275							280					285			
Leu	Gln	Gly	Asp	Ser	Asn	Cys	Leu	Lys	Cys	Phe	Arg	Tyr	Arg	Leu	Asn
290						295					300				
Asp	Lys	Tyr	Lys	His	Leu	Phe	Glu	Leu	Ala	Ser	Ser	Thr	Trp	His	Trp
305					310					315				320	
Ala	Ser	Pro	Glu	Ala	Pro	His	Lys	Asn	Ala	Ile	Val	Thr	Leu	Thr	Tyr
				325					330					335	
Ser	Ser	Glu	Glu	Gln	Arg	Gln	Gln	Phe	Leu	Asn	Ser	Val	Lys	Ile	Pro
		340						345					350		
Pro	Thr	Ile	Arg	His	Lys	Val	Gly	Phe	Met	Ser	Leu	His	Leu	Leu	
	355						360						365		

<210> 9

<211> 368

<212> PRT

<213> Artificial Sequence

<220>

<223> HPV6b E2 amino acid sequence including a point
mutation to remove biological activity

<400> 9

Met	Glu	Ala	Ile	Ala	Lys	Arg	Leu	Asp	Ala	Cys	Gln	Glu	Gln	Leu	Leu
1				5					10					15	
Glu	Leu	Tyr	Glu	Glu	Asn	Ser	Thr	Asp	Leu	His	Lys	His	Val	Leu	His
			20					25					30		
Trp	Lys	Cys	Met	Arg	His	Glu	Ser	Val	Leu	Leu	Tyr	Lys	Ala	Lys	Gln
		35					40					45			
Met	Gly	Leu	Ser	His	Ile	Gly	Met	Gln	Val	Val	Pro	Pro	Leu	Lys	Val
	50					55					60				
Ser	Glu	Ala	Lys	Gly	His	Asn	Ala	Ile	Glu	Met	Gln	Met	His	Leu	Glu
65					70				75					80	
Ser	Leu	Leu	Arg	Thr	Glu	Tyr	Ser	Met	Glu	Pro	Trp	Thr	Leu	Gln	Glu
			85						90					95	
Thr	Ser	Tyr	Glu	Met	Trp	Gln	Thr	Pro	Pro	Lys	Arg	Cys	Phe	Ala	Lys
			100					105					110		
Arg	Gly	Lys	Thr	Val	Glu	Val	Lys	Phe	Asp	Gly	Cys	Ala	Asn	Asn	Thr
	115							120					125		

Met	Asp	Tyr	Val	Val	Trp	Thr	Asp	Val	Tyr	Val	Gln	Asp	Asn	Asp	Thr
130						135					140				
Trp	Val	Lys	Val	His	Ser	Met	Val	Asp	Ala	Lys	Gly	Ile	Tyr	Tyr	Thr
145					150					155					160
Cys	Gly	Gln	Phe	Lys	Thr	Tyr	Tyr	Val	Asn	Phe	Val	Lys	Glu	Ala	Glu
				165					170					175	
Lys	Tyr	Gly	Ser	Thr	Lys	His	Trp	Glu	Val	Cys	Tyr	Gly	Ser	Thr	Val
			180					185					190		
Ile	Cys	Ser	Pro	Ala	Ser	Val	Ser	Ser	Thr	Thr	Gln	Glu	Val	Ser	Ile
	195						200					205			
Pro	Glu	Ser	Thr	Thr	Tyr	Thr	Pro	Ala	Gln	Thr	Ser	Thr	Leu	Val	Ser
	210					215					220				
Ser	Ser	Thr	Lys	Glu	Asp	Ala	Val	Gln	Thr	Pro	Pro	Arg	Lys	Arg	Ala
225				230					235						240
Arg	Gly	Val	Gln	Gln	Ser	Pro	Cys	Asn	Ala	Leu	Cys	Val	Ala	His	Ile
			245					250						255	
Gly	Pro	Val	Asp	Ser	Gly	Asn	His	Asn	Leu	Ile	Thr	Asn	Asn	His	Asp
		260					265					270			
Gln	His	Gln	Arg	Arg	Asn	Asn	Ser	Asn	Ser	Ser	Ala	Thr	Pro	Ile	Val
	275					280						285			
Gln	Phe	Gln	Gly	Glu	Ser	Asn	Cys	Leu	Lys	Cys	Phe	Arg	Tyr	Arg	Leu
	290					295				300					
Asn	Asp	Arg	His	Arg	His	Leu	Phe	Asp	Leu	Ile	Ser	Ser	Thr	Trp	His
305				310					315						320
Trp	Ala	Ser	Ser	Lys	Ala	Pro	His	Lys	His	Ala	Ile	Val	Thr	Val	Thr
			325					330					335		
Tyr	Asp	Ser	Glu	Glu	Gln	Arg	Gln	Gln	Phe	Leu	Asp	Val	Val	Lys	Ile
		340					345				350				
Pro	Pro	Thr	Ile	Ser	His	Lys	Leu	Gly	Phe	Met	Ser	Leu	His	Leu	Leu
	355						360				365				

<210> 10

<211> 1965

<212> DNA

<213> Artificial Sequence

<220>

<223> Codon optimised and mutated nucleotide sequence
for HPV6b E1

<400> 10

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ttcatggttg aagcaatcgt tcagcatccg actggtaccc agatctccga tgacgaagac 120
gaagaagttg aagattctgg ttacgacatg gttgacttca tcgatgactc caacatcact 180
cataactctc tgggaagcaca ggctctgttt aaccgccagg aagctgatac ccattacgct 240
actgttcagg acctgggagg caaatatctg ggctctccgt acgtttcccc gatcaacact 300
atcgcagaag cagttgagtc tgaaatctcc ccgcgcctgg acgctatcaa actgactcgt 360
cagccgaaga aggttaaacg tcgtctgttc cagactcgtg aactgaccga ctccggttac 420
ggttatagcg aagttgaggc tggcaccggc acccagggtg aaaaacacgg tgtaccggaa 480
aacggcgggc acggtcagga aaaggacacc ggccgcgaca tcgaggggtg ggaacacacc 540
gaagctgaag ctccgactaa ctctgttcgt gaacacgcag gtactgcggg tatcctggaa 600
ctgctgaaat gcaaagacct gcgcgcggt ctgctgggca aattcaaaga atgcttcggc 660
ctgtctttca ttgacctgat ccgtccgttt aagtctgaca aaactacctg tctggactgg 720
gttgtagcag gcttcggcat ccaccactct atctctgaag cattccagaa actgatcgag 780
ccgctgtctc tgtacgcgca catccagtgg ctgactaacg cttgggggtat ggttctgctg 840
gtactgctgc gctttaaagt aaacaaatct cgttccactg ttgctcgtac tctggctacc 900
ctgctgaaca tcccgagaa ccagatgctg atcgaaccgc cgaaaatcca gtctgggtga 960
gctgcactgt actggtttcg tactggcatc tctaacgcta gcactgttat cggtgaagca 1020
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atgcaggcta aatacgtaaa agactgogct accatgtgcc gtcactaaa acacgcggaa 1260
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ggtaactgga aaccgatcgt tcagttcctg cgccatcaga acatcgaatt catcccgctc 1380
ctgaccaaatt caagctgtg gctgcacggc accccgaaaa aaaactgcat cgctatcgta 1440
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aaagtagctc tgctggacga cgcgacccag ccgtgctgga tctacatgga tacttacatg 1620
cgcaacctgc tggacggtaa cccgatgtct atcgaccgta aacacaaagc gctgactctg 1680
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aagtacctgc ataccggtgt tactaccttt actttcccga acccgttccc gtttgatcgt 1800
aacggtaacg ctgtttacga actgtccaac actaactgga aatgcttctt cgagcgtctg 1860
tcttctccc tggacatcca ggactctgaa gatgaagaag atggttctaa ctctcaggct 1920
ttccgttggtg ttccgggtac tggtgttcgt actctgtgag gatcc 1965
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<210> 11

<211> 1119

<212> DNA

<213> Artificial Sequence

<220>

<223> Codon optimised and mutated nucleotide sequence
for HPV11 E2

<400> 11

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ctgtacgagg agaacagcat tgacatccat aagcacatca tgcactggaa gtgcattcgc 120
ctggagagcg tgctgttgca caaggccaag cagatgggcc tgtcccacat aggccttcag 180
gtgggtcccc ctctgaccgt gtcagagaca aagggccata acgcaatcga gatgcagatg 240
cacctcgagt cgctggcgaa aacacagtac ggcgtggagc catggaccct gcaggacacc 300
tcgtacgaaa tgtggctgac cccacctaag cgatgcttcg ccaaacaggg caacacagtg 360
gaggtgaagt tcgacggctg tgaggataac gttatggagt atgtcgtgtg gacgcacatc 420
tatctgcagg acaacgacag ttgggtgaag gtgaccagct ccgtggacgc gaagggcatc 480
tactatacct gtgggcagtt taaaacctac tatgtgaact tcaacaaaga ggcccaaaag 540
tatggctcca ccaaccactg ggaggtctgc tatgggagca cggtgatttg ctctcccgcc 600
agcgtgtcta gactgtgcg cgaggtgagc attgccgagc cgaccacgta caccctgcc 660
cagacgaccg ctccgaccgt gtctgcttgt actaccgagg acggcgtgag cgctccaccc 720
aggaagcgtg cgagggggccc aagcaccaac aacaccctct gtgtggcgaa cattcgcagc 780
gtcgacagta ccatcaataa catcgtgacg gataactata acaagcacca gaggcgtaac 840
aactgtcact ctgccgcaac ccccatcgtg cagctccagg gagacagcaa ttgccttaag 900
tgcttcgct atcgctcaa cgacaagtac aagcacctct ttgagctcgc ctcgtcgacg 960
tggcactggg cctcaccgga ggcacctcac aagaacgcca tcgtcactct cacttactcc 1020
agtgaggagc agagacagca gtttctgaac agcgtgaaga tcccaccgac gatccgcat 1080
aaggtcggct tcatgtcact gcatctcttg tgaggatcc 1119
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<210> 12

<211> 45

<212> DNA

<213> Artificial Sequence

<220>

<223> Oligonucleotide linker

<400> 12

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45

<210> 13

<211> 45

<212> DNA

<213> Artificial Sequence

<220>

<223> Oligonucleotide linker

<400> 13

ggccgggatcc gtcgacatct ggtaccgata tcgctagcgg ccgca

45

<210> 14

<211> 23

<212> PRT

<213> Human papillomavirus type 6b

<400> 14

Cys Ser Ser Ser Leu Asp Ile Gln Asp Ser Glu Asp Glu Glu Asp Gly

1

5

10

15

Ser Asn Ser Gln Ala Phe Arg

20

<210> 15

<211> 22

<212> PRT

<213> Human papillomavirus type 6b

<400> 15

Met Glu Ala Ile Ala Lys Arg Leu Asp Ala Cys Gln Glu Gln Leu Leu

1

5

10

15

Glu Leu Tyr Glu Glu Cys

20

<210> 16

<211> 45

<212> DNA

<213> Homo sapien

<400> 16

agcttgcggc cgctagcgat atcggtacca tatgtcgacg gatcc

45

<210> 17
<211> 45
<212> DNA
<213> Homo sapien

<400> 17
acgccggcga tcgctatagc catggtctac agctgcctag gccgg

45

<210> 18
<211> 23
<212> PRT
<213> Oryctolagus cuniculus

<400> 18
Cys Ser Ser Ser Leu Asp Ile Gln Asp Ser Glu Asp Glu Glu Asp Gly
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Ser Asn Ser Gln Ala Phe Arg
20

<210> 19
<211> 22
<212> PRT
<213> Human papillomavirus type 6b

<400> 19
Met Glu Ala Ile Ala Lys Arg Leu Asp Ala Cys Gln Glu Gln Leu Leu
1 5 10 15
Glu Leu Tyr Glu Glu Cys
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<210> 20
<211> 16
<212> PRT
<213> Oryctolagus cuniculus

<400> 20
Met Ala Ala Arg Lys Gly Thr Asp Ser Glu Thr Glu Asp Gly Gly Cys
1 5 10 15

<211> 20

<212> PRT

<213> Oryctolagus cuniculus

<400> 21

Cys Lys His Leu Asp Leu Ser Asp Pro Glu Asp Gly Glu Asp Gly Glu
1 5 10 15
Thr Gln Arg Gly
20